

Application No. 18/620,749
Amendment Dated 02 September 2004
Reply to Office Action of 2 June 2004

Attorney Docket No. 5701-01293

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-6 have been cancelled without prejudice.

7. (original): A method of estimating a state of a target vehicle on a roadway, comprising::

- a. generating an estimate of a curvature of the roadway;
- b. estimating an unconstrained state and associated covariance thereof of the target vehicle;
- 5 c. establishing at least one prospective constraint of the target vehicle, wherein at least one prospective constraint is responsive to said estimate of the curvature of the roadway;
- d. estimating at least one constrained state and associated covariance thereof of the target vehicle corresponding to said at least one prospective constraint of the target vehicle;
- 10 e. determining a most likely state of the target vehicle, wherein said most likely state of the target vehicle is selected from said unconstrained state of the target vehicle and said at least one constrained state of the target vehicle; and
- f. if said at least one constrained state of the target vehicle is the most likely state, then
- 15 fusing the unconstrained state and covariance thereof of the target vehicle with the associated constrained state and covariance of said most likely state and outputting at least one of the fused state and the associated fused covariance thereof of the target as the estimated state or covariance of the target; otherwise outputting at least one of the unconstrained state and the associated unconstrained covariance thereof
- 20 of the target as the estimated state or covariance of the target.

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8. (original): A method of estimating a state of a target vehicle on a roadway as recited in claim 7, wherein the operation of estimating the curvature of the roadway comprises:
- a. generating a speed measurement by measuring a longitudinal speed of a host vehicle traveling on the roadway;
 - 5 b. generating a yaw rate measurement by measuring or determining a yaw rate of said host vehicle; and
 - c. estimating at least one curvature parameter, wherein said at least one curvature parameter is representative of a curvature of the roadway, and the operation of estimating at least one curvature parameter is responsive to said speed measurement
 - 10 and is responsive to said yaw rate measurement.
9. (original): A method of estimating a state of a target vehicle on a roadway as recited in claim 8, wherein said at least one curvature parameter comprises at least one parameter of a clothoid model of curvature, and said Clothoid model of curvature is referenced to a coordinate system of said host vehicle.
10. (original): A method of estimating a state of a target vehicle on a roadway as recited in claim 9, wherein said at least one curvature parameter comprises first and second parameters of a clothoid model, wherein said first parameter is a constant, and said second parameter is a sensitivity of curvature to a distance along the roadway.
11. (original): A method of estimating a state of a target vehicle on a roadway as recited in claim 8, wherein the operation of estimating at least one curvature parameter comprises processing said measurements of speed and yaw rate with at least one Kalman filter.
12. (original): A method of estimating a state of a target vehicle on a roadway as recited in claim 11, wherein said at least one Kalman filter comprises first and second Kalman filters, said first Kalman filter is adapted to estimate a first set of state variables from said speed measurement and from said yaw rate measurement, and said second Kalman
- 5 filter is adapted to estimate said at least one curvature parameter from said estimate of said first set of state variables.
13. (original): A method of estimating a state of a target vehicle on a roadway as recited in claim 12, wherein said first set of state variables comprises vehicle velocity, vehicle acceleration, vehicle yaw rate and vehicle yaw acceleration.

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14. (original): A method of estimating a state of a target vehicle on a roadway as recited in claim 7, wherein the operation of estimating an unconstrained state and associated covariance of the target vehicle comprise:

a. measuring a range, a range rate and an azimuth of the target vehicle relative to a host vehicle; and

b. estimating said unconstrained state of the target vehicle from said measurements of